AIR SPARGE (AS)/ SOIL VAPOR EXTRACTION (SVE) SYSTEM

DESIGNED FOR:
ARCO PRODUCTS COMPANY
ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA

DRAWING LIST		
SECTION	DRAWING NUMBER	DRAWING TITLE
GENERAL	G-1	SYMBOL & LEGEND SHEET
	G-2	SPECIFICATIONS
	G-3	SITE LAYOUT WITH TRENCHING PLAN
	G-4	CONSTRUCTION DETAILS
PIPING	P-1	PROCESS & INSTRUMENTATION DIAGRAM
	P-2	PIPING ISOMETRIC
	P-3	EQUIPMENT LAYOUT
ELECTRICAL	E-1	ELECTRICAL SINGLE-LINE, ETC.

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TITLE SHEET
AS/SVE SYSTEM
ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

FIGURE: TS
DATE: 02/11/00
PROJECT NO: M0600-044-01

I:\M0600\044\DWG\M044TS

SYMBOL SPECIFICATION

INSTRUMENT TYPE:

PS	PRESSURE SWITCH
PI	PRESSURE INDICATOR
FI	FLOW INDICATOR
FQI	FLOW METER (TOTALIZING)
CI	CAPACITIVE SENSOR
TI	TEMPERATURE INDICATOR
TT	TEMPERATURE TRANSDUCER
TS	TEMPERATURE SENSOR
LEL	EXPLOSIVITY METER
SL	STATUS LAMP
PC	PRESSURE CONTROL
SP	SAMPLE POINT

LINE DESIGNATION:

2 – VR – 01 – PV

2	VR	01	PV
SIZE IN INCHES	PROCESS	LINE NUMBER	MATERIAL SPECIFICATION

PROCESS:

V	VACUUM
VR	VAPOR REMOVAL
AD	AIR

MATERIAL SPECIFICATION:

PV	POLYVINYL CHLORIDE
GM	GALVANIZED
RC	RIGID COPPER

EQUIPMENT:

CT	CONDENSATE TRAP
CV	CONTROL VALVE
DS	DISCHARGE SILENCER
FC	FLEXIBLE CONNECTOR
SV	SOIL VENT
VB	VACUUM BLOWER
PF	PARTICULATE FILTER
C	COMPRESSOR
B	BLOWER
CP	CONTROL PANEL
PRV	PRESSURE RELIEF VALVE

VALVES, FITTINGS & PIPING

- HAND CONTROL
- BLOWDOWN
- GATE
- CLOSED
- GLOBE
- CHECK
- PLUG
- BALL
- BUTTERFLY OR DAMPER
- NEEDLE
- THREE WAY
- ELECTRIC CONTROL GATE
- ELECTRIC BUTTERFLY OR DAMPER
- BLEED OR PURGE CONNECTION
- AIR RELEASE
- SOLENOID
- VACUUM RELIEF VALVE
- FOOT VALVE
- FLEXIBLE PIPE
- CROSSOVER
- FLANGED CONNECTION
- SCREWED CONNECTION
- UNION
- COUPLING
- REGULATOR
- EXPANSION JOINT/SLEEVE
- HOSE CONNECTION
- INLINE TRAP
- INLINE FILTER
- STRAINER (BASKET TYPE)
- PLUG
- PIPE CAP
- SLIP UPDRAFT VENT CAP
- ELBOW – TURNED UP
- ELBOW – TURNED DOWN
- ELBOW – 90°
- ELBOW – 45°
- ELBOW – LONG RADIUS
- REDUCING ELBOW
- QUICK CONNECT COUPLING
- BUSHING
- REDUCER (CONCENTRIC)
- TEE REDUCING
- TEE (OUTLET UP)
- TEE (OUTLET DOWN)
- TEE

SITE SYMBOLS

- GROUNDWATER MONITOR WELL (4 in DIAMETER)
- SVE WELL
- NESTED SVE/AS WELL
- TEMPORARY BENCHMARK
- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CATCH BASIN
- TREE/SHRUB
- TREE LINE
- HYDRANT
- SURVEY MONUMENT
- FENCE LINE
- RAILROAD TRACKS
- R/W — RIGHT OF WAY
- PROPERTY BOUNDARY
- E — OVERHEAD ELECTRIC LINE
- E — UNDERGROUND ELECTRIC LINE
- G — GAS LINE
- T — OVERHEAD TELEPHONE LINE
- T — UNDERGROUND TELEPHONE LINE
- W — WATER LINE
- SS — SANITARY SEWER LINE
- S — STORM SEWER LINE
- PROCESS LINES ABOVE GRADE
- PROCESS LINES BELOW GRADE
- PNEUMATIC LINES ABOVE GRADE
- PNEUMATIC LINES BELOW GRADE
- LINES FOR FUTURE USE
- PIPING TRENCH

ARCHITECTURAL SYMBOL DESIGNATIONS

- 1 — OBJECT IDENTIFICATION
- XX — ROOM/SPACE IDENTIFICATION
- 2 — VERTICAL GRID REFERENCE LINE
- A — HORIZONTAL GRID REFERENCE LINE
- X / XXX — INDICATES SECTION/DETAIL NUMBER; INDICATES DRAWING SHEET ON WHICH SECTION/DETAIL IS SHOWN
- X / XXX — INDICATES AREA SHOWN IN REFERENCED DETAIL
- X / XXX — INDICATES SECTION NUMBER; INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN; SECTION CUT
- X / XXX — TITLE; SCALE

INSTRUMENTATION, CONTROLS & EQUIPMENT

- PI — PRESSURE INDICATOR
- TI — TEMPERATURE INDICATOR
- FI — FLOW INDICATOR
- BLOWER
- FILTER WITH DRAIN
- SILENCER
- TURBINE FLOWMETER W/ELECTRIC OUTPUT

INSTRUMENTATION

INSTRUMENT TYPE — PI
IDENTIFICATION NUMBER — 1
INSTRUMENTS WITH LOCAL DISPLAYS NO REMOTE INPUT OR OUTPUT

SENSOR TYPE & NUMBER — TYPE / SENSOR
INSTRUMENTS WITH INPUTS OR OUTPUTS AT THE SITE CONTROL PANEL

(SENSOR DESIGNATION)

D	O	1
D=DISCRETE A=ANALOG H=HI SPEED	O=OUTPUT I=INPUT	SENSOR NUMBER

INSTRUMENT IS CONTROLLED OFFSITE

INSTRUMENT WITH INPUTS OR OUTPUTS LOCATED AT A LOCAL CONTROL PANEL OTHER THAN THE SITE CONTROL PANEL

ELECTRICAL SYMBOLS

- S — ELECTRICALLY OPERATED SOLENOID
- SEALOFF
- WP — 120 V RECEPTACLE – WEATHER PROOF
- JUNCTION BOX
- MAGNETIC MOTOR STARTER
- THERMAL OVERLOAD SWITCHES
- LAMP
- LIMIT SWITCH
- LEVEL SWITCH
- PRESSURE SWITCH
- TEMPERATURE SWITCH
- SOLENOID
- CR — CONTROL RELAY
- t° OR T — THERMOSTAT

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SYMBOL & LEGEND SHEET
AS/SVE SYSTEM
ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

DRAWING #: G–1
DATE: 02/11/00
PROJECT NO: M0600–044–01

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1.0 INTRODUCTION

The enclosed drawings and specifications contain information for the construction and installation of the entire Soil Vapor Extraction (SVE) Air Sparge (AS) system. The following drawings depicting the SVE/AS system are required for construction and installation:

Drawing No.	Revision	Title
G-1	1	Symbol and Legend Sheet
G-2	1	Specifications
G-3	1	Site Layout with Trenching Plan
G-4	1	Construction Details
P-1	1	Process and Instrumentation Diagram
P-2	1	Piping Isometric
P-3	1	Equipment Layout
E-1	1	Electrical Plan

This package also contains the following specifications required for construction and installation:

- General
- Excavation
- Piping
- Electrical
- Equipment
- Equipment Enclosure

2.0 SPECIFICATIONS

2.1 General

1. The selected contractor shall verify all dimensions and site conditions before starting work. The consultants Project Manager shall be notified of any discrepancy.
2. The contractor shall confirm a work schedule with the consultants Project Manager at least 72-hours prior to any work at the site.
3. All materials used for construction of the system shall be new.
4. Equipment and instruments within the system that are specifically defined and for which manufacturer's information sheets have been supplied shall be provided by the Consultant for installation by the contractor. All materials not specifically defined shall be provided by the contractor.
5. All necessary construction permits and inspections shall be obtained and paid for by the contractor, including permits for electrical, mechanical and civil construction. Consultant to obtain the required Maricopa County Division of Air Pollution Control permits to construct/operate the vapor treatment unit.
6. The contractor will restore all excavated surface areas to original condition.
7. All construction areas shall be clearly marked with barricades, cones, plates or other approved safety markers to restrict access and provide a safe work environment for the contractor.
   (Note: The full dispensers will be accessible to traffic as much as possible by utilizing steel plates)
8. A pre-construction meeting between the contractor and consultant will be required before any work begins. The meeting will be held at the site.
9. The contractor shall provide an electrician for one day during start-up of the equipment.
10. The contractor shall warranty all materials and construction for a period of one year. All defects shall be corrected at no expense to the owner consultant or Arco.

2.2 Excavation

1. All excavated soils shall be placed adjacent to the trench. The consultant will sample the excavated soil for hydrocarbons. All contaminated soil shall be placed on plastic in an area designated by the consultant and covered with plastic. Soil that is not contaminated can be stockpiled along the trench and used as backfill. The contractor shall dispose of all construction debris off-site including any pavement removed during trenching.
2. Where piping is installed below ground, the pipe shall be buried in a trench or excavation at a minimum depth of 18-inches to the top of the pipe, unless otherwise stated. Piping for electrical conduits shall be buried in a trench at a minimum depth of 24-inches to the top of the conduit. The excavations shall be saw cut to provide a square vertical joint for repaving. If excavations must remain open after normal work hours, they shall be barricaded to deter foot or vehicular traffic. Excavations shall not remain open over a weekend.
3. Process piping trenches and excavations shall be backfilled with imported clean sand or pea gravel material from 3-inches below the piping to 2-inches above the piping. Upon approval by the consultant, native soil may be used as backfill material from 2-inches above the piping to the bottom of the concrete or asphalt base material. The backfill material shall be compacted to 90% of the relative dry density. Pavement removed for trenches or other excavations shall be replaced with new material to match existing material, thickness and color. Base material shall be compacted to 95% of the relative dry density. The asphalt mix shall be designed and installed to allow for normal facility traffic including construction and maintenance trucks. When resurfacing with concrete, a minimum of 4-inch thick, 2,500 psi reinforced concrete shall be used. Reinforcing shall be No. 3 rebar tied into the existing slab 12-inches on center placed at mid-height.

2.3 Piping

1. All underground process piping shall be schedule 40 PVC with glued slip fittings or copper, all aboveground process piping shall be schedule 80 PVC with glued slip fittings or copper as indicated on the drawings. Unless otherwise stated, all valves shall be PVC slip fitted as indicated in the drawings. All sparge lines will be 1" dia. rolled copper.
2. When connecting to existing underground piping the contractor shall first verify the existing piping path. Existing piping paths where shown on drawings are approximate.
3. Where piping is routed above ground, inside the equipment enclosure, the piping shall be supported by unistrut pipe supports and clamps. The unistrut supports shall be fastened to a base that is secured to the ground surface. If the equipment enclosure is located on dirt or asphalt, the unistrut may be driven into the ground. If on concrete, fasten unistrut base via expansion connectors. The Southwest Gas Corporation (SWG) will install a gas supply line and meter. The contractor shall install an (above or below ground) 1-inch diameter gas line (as indicated on the drawings) to connect the SWG meter to the C-1 unit, and arrange and pay for all necessary inspections and permits. Gas piping shall be installed and pressure tested in accordance with applicable codes and regulations. The consultant will work with the contractor to shall place the new billing in the following name:

ARCO 1523
c/o SECOR International Inc.
1830 W. University Drive, Suite 106
Phoenix, Arizona 85281-3248
Attn: Phil Schneider

4. Prior to backfilling, all process piping shall be pressure tested with air at 5 psi held for one hour and witnessed by a consultant's representative. Do not test through instruments or equipment.

2.4 Electrical

1. The contractor shall furnish and install all necessary equipment to connect to the local electric service and route the appropriate electrical service to the C-1 control panel. If necessary, a temporary power pole can be insatlled no closer than 5-feet from the equipment enclosure. The contractor will be responsible for providing power to the vapor treatment unit and obtaining the electrical permit for operation of the equipment. The contractor shall verify operation of all electrical equipment upon completion of the work.
2. The contractor shall acquire all necessary permits and pay all associated fees for install of electrical services.
3. The electrical service shall be equipped with a power meter and weather tight main panel with lockable shut-off switch located outside the equipment enclosure. The consultant will work with the contractor to place the new service billing in the following name:

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Attn: Phil Schneider

4. All electrical work shall be completed in accordance with the most recent edition of the N.E.C., the local builidng department and the local fire department. Any drawings required for permits other than those presented herein will be the responsibility of the contractor and shall be reviewed by the consultant prior to use.
5. The installation within the equipment enclosure shall be considered a Class I, Division II environment. All wiring, connectors, conduit and contractor supplied equipment shall comply with Class I, Division II requirements.
6. All wiring shall be contained in conduits and conduits shall be securely fastened to the enclosure walls as allowed by local code. Conduits may be buried as allowed by local code.
7. The contractor shall arrange for the installation of telephone service to the C-1 vapor treatment unit. The consultant will work with the contractor to place the new service billing in the following name:

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Phoenix, Arizona 85281-3248
Attn: Phil Schneider

2.5 Equipment

The following equipment will be provided to the contractor by the Consultant for installation:

Item No.	Item
C-1	Vapor Treatment Unit (This unit will contain the vacuum blower B-1 with a control panel)
C-2	Air Sparge Unit (This unit will contain the compressor blower B-2 with a control panel)

Vapor Treatment Unit (C-1)	Air Sparge Unit (C-2)
Baker 200 CFM	10 hp, 100 CFM, 30 psi Compressor
Thermal Oxidizer/Catalytic Oxidizer	480 Volt, Three Phase
230 Volt, Single Phase	

2.6 Equipment Enclosure

1. Contractor to install the following signage on all sides of the enclosure:
   - DANGER HIGH VOLTAGE
   - DANGER FLAMMABLE GAS
   - NO SMOKING
   - OTHERS AS PER LOCAL CODE

   The signs shall be made of fiberglass reinforced plastic and shall be at least 10-inches by 14-inches.

3.0 SAFETY/CLEAN-UP

1. The contractor shall read, sign and abide by the consultants Site Specific Health and Safty Plan prior to beginning any work.
2. The contractor shall contain loose debris and store construction materials on a daily basis prior to departure from the site to provide a clean and orderly work area.

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SPECIFICATIONS
AS/SVE SYSTEM
ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

DRAWING #: G-2
DATE: 02/11/00
PROJECT NO: M0600-044-01

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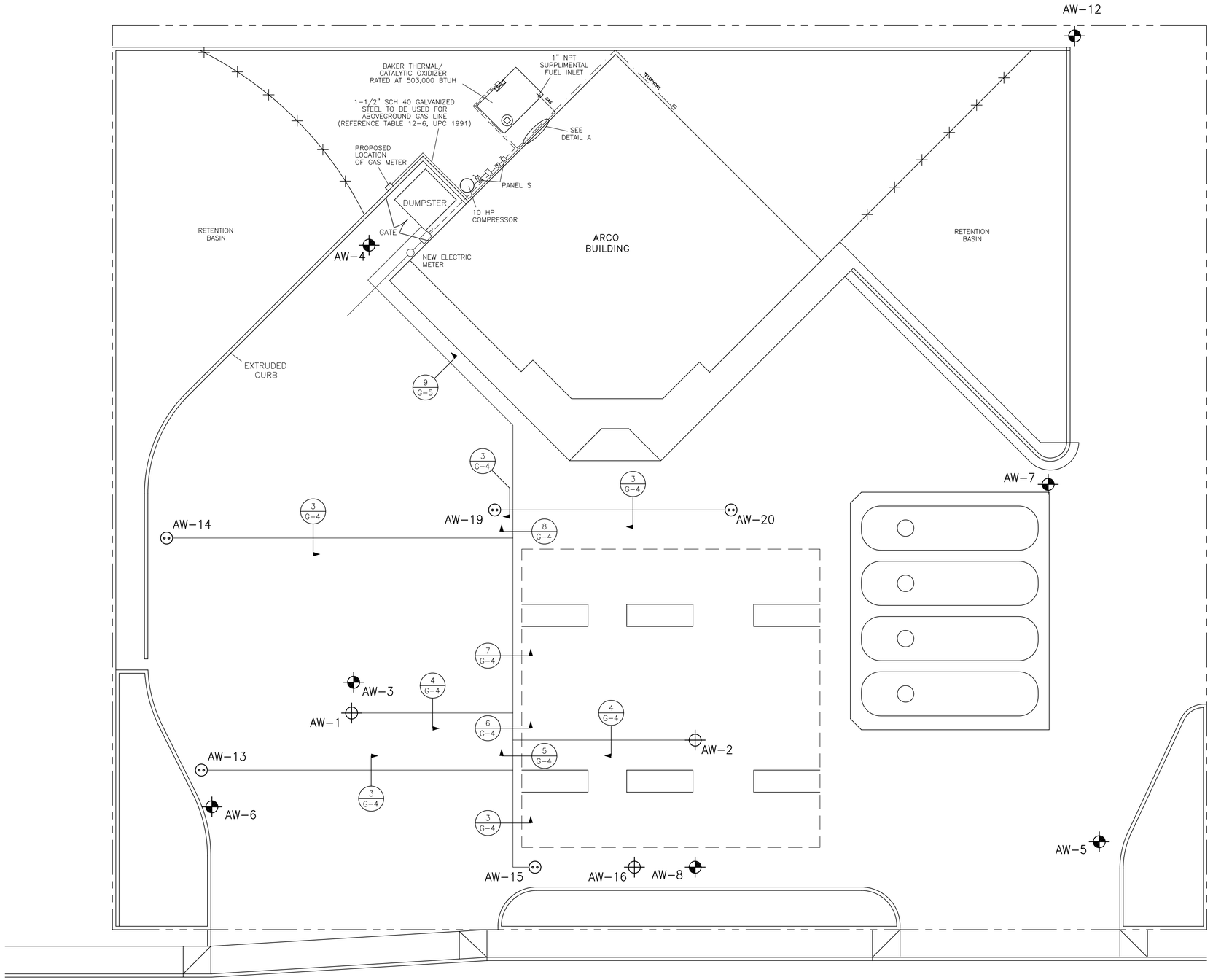
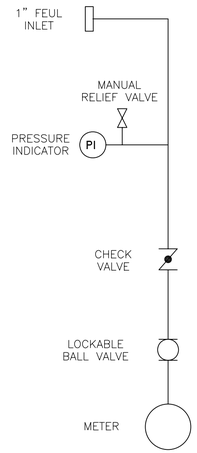


LEGEND

- NESTED SOIL VAPOR EXTRACTION (SVE) AIR SPARGE WELL (AS) — 2 / G-4
- SVE WELL — 1 / G-4
- GROUNDWATER MONITORING WELL



DETAIL A
NOT TO SCALE

N

SCALE: 1" = 10'-0"

SEAL:

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SITE LAYOUT W/ TRENCHING PLAN AS/SVE SYSTEM

ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

DRAWING #: G-3
DATE: 02/11/00
PROJECT NO: M0600-044-02

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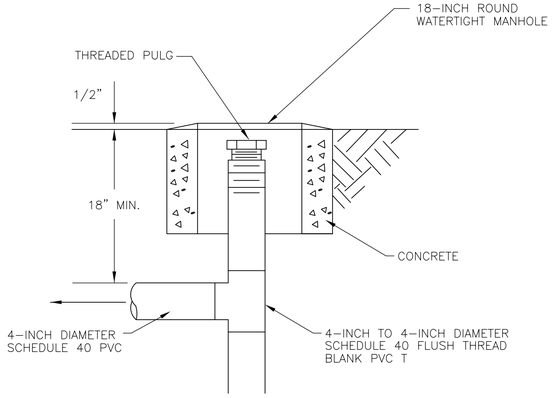
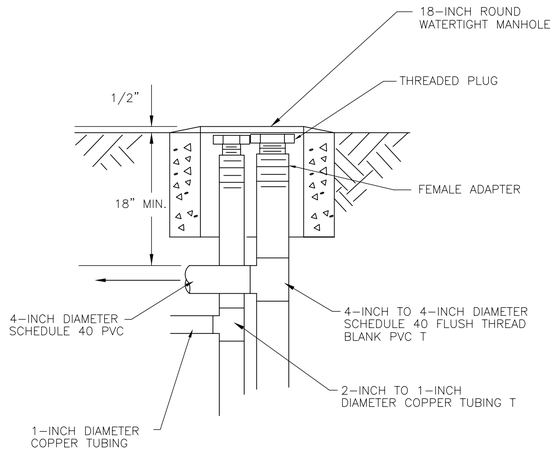


PIPING LATERAL SHOULD
SLOPE DOWN TOWARDS WELL
AT 6–INCHES PER 100–FEET.

1 G–4

SVE WELL PIPING DETAIL

NOT TO SCALE

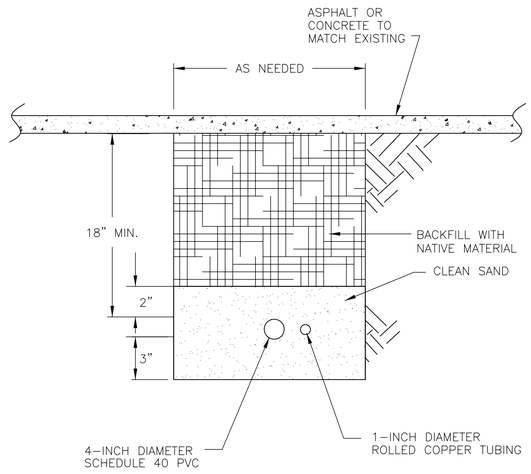


PIPING LATERAL SHOULD
SLOPE DOWN TOWARDS WELL
AT 6–INCHES PER 100–FEET.

2 G–4

2–INCH NESTED SVE/AS WELL PIPING DETAIL

NOT TO SCALE



3 G–4

AS/SVE LATERAL TRENCH DETAIL

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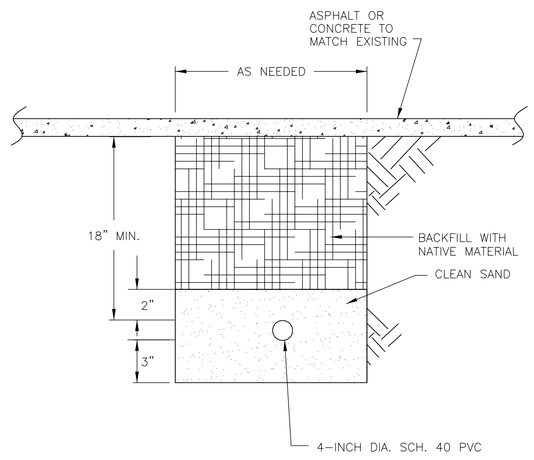

4 G–4

SVE LATERAL TRENCH DETAIL

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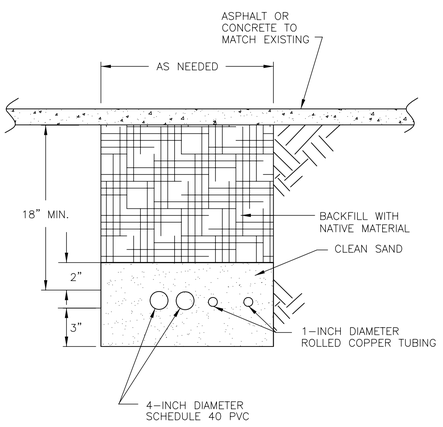

5 G–4

AS/SVE LATERAL TRENCH DETAIL

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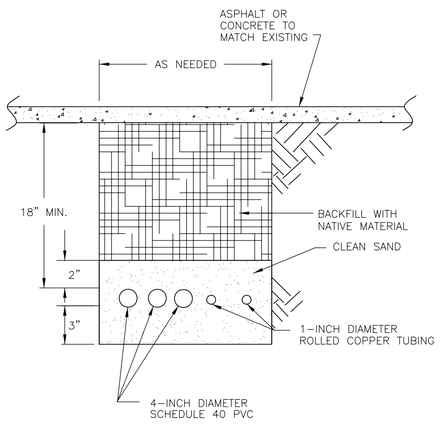

6 G–4

AS/SVE LATERAL TRENCH DETAIL

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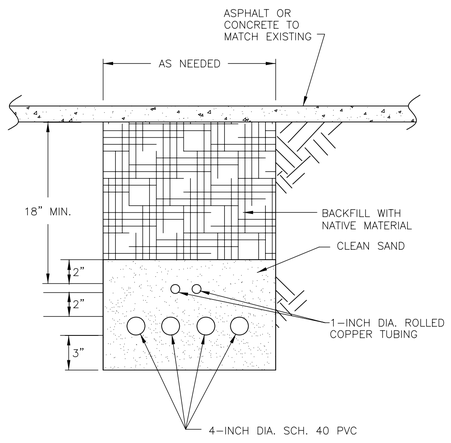

7 G–4

AS/SVE LATERAL TRENCH DETAIL

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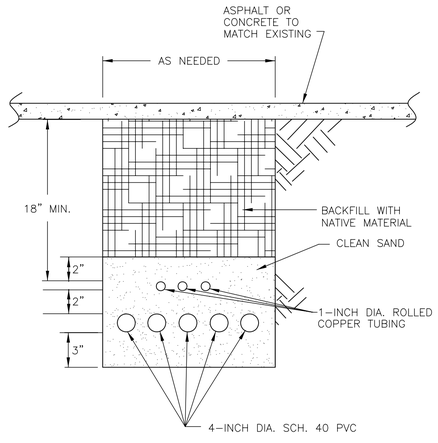
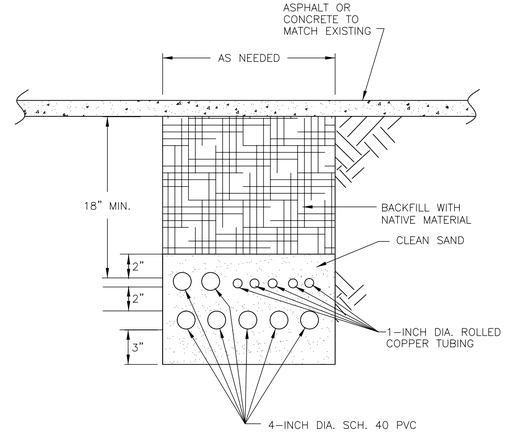


8 G–4

AS/SVE LATERAL TRENCH DETAIL

NOT TO SCALE



9 G–4

AS/SVE LATERAL TRENCH DETAIL

NOT TO SCALE

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CONSTRUCTION DETAILS
AS/SVE SYSTEM
ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

DRAWING #: G–4
DATE: 01/12/00
PROJECT NO: M0600–044–02

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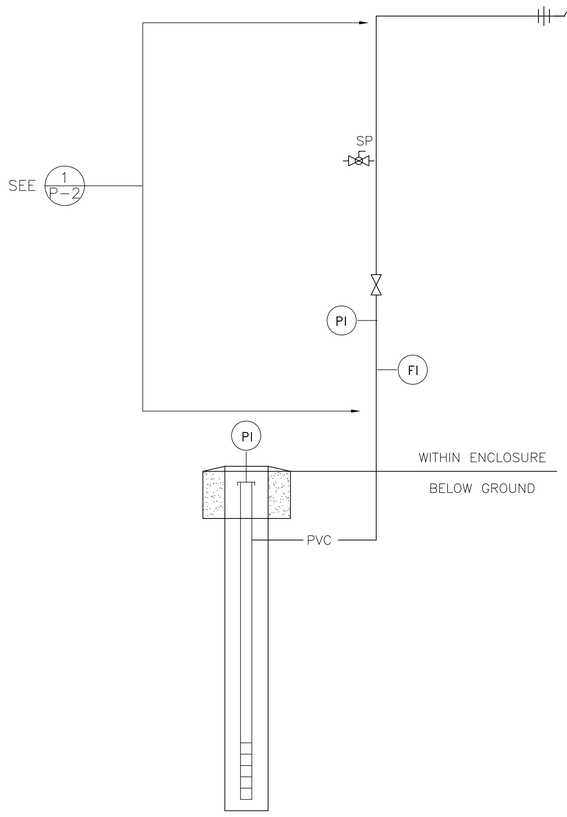
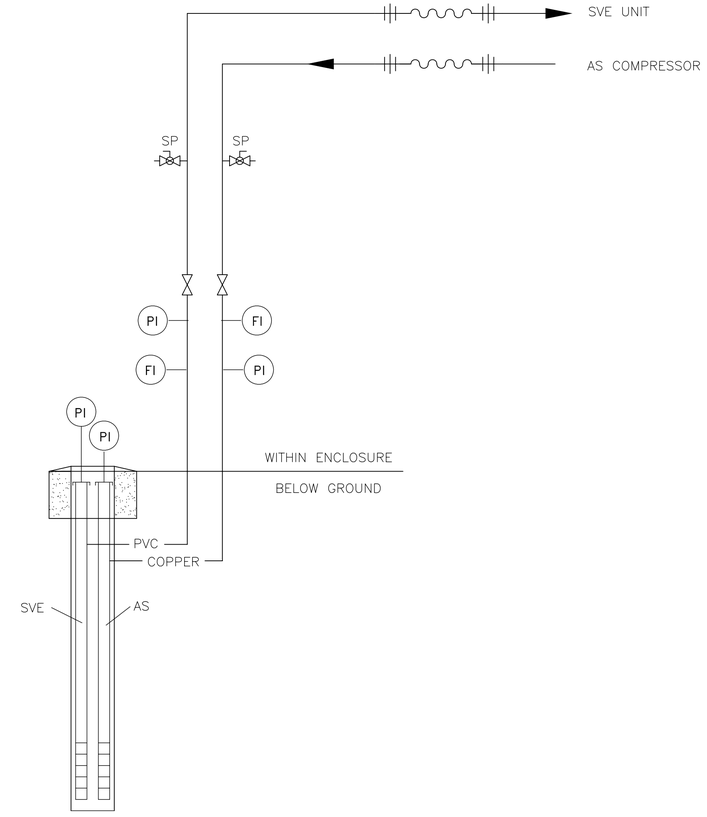


SVE WELL(S)
AW-1 AND AW-2
(SEE TABLE 1)



NESTED WELL
AW-13, AW-14, AW-15, AW-19, AND AW-20
(SEE TABLE 1)

TABLE 1 WELL DATA

WELL NUMBER	WELL TYPE	CASING MATERIAL	NOMINAL DIAMETER (INCHES)	TOTAL DEPTH (FEET)	SCREENED INTRERVAL (FEET)	SLOT SIZE (INCHES)
AW-1	SOIL VAPOR EXTRACTION (SVE)	PVC. SCH. 40	4"	73	8-68	.02
AW-2	SOIL VAPOR EXTRACTION (SVE)	PVC. SCH. 40	4"	70	13-63	.02
AW-13	NESTED AIR SPARGE (AS)/SOIL VAPOR EXTRACTION (SVE)	PVC. SCH. 40	2"/4"	88	80-85/69-79	.02
AW-14	NESTED AIR SPARGE (AS)/SOIL VAPOR EXTRACTION (SVE)	PVC. SCH. 40	2"/4"	87	75-80/55-65	.02
AW-15	NESTED AIR SPARGE (AS)/SOIL VAPOR EXTRACTION (SVE)	PVC. SCH. 40	2"/4"	87	80-85/55-65	.02
AW-19	NESTED AIR SPARGE (AS)/SOIL VAPOR EXTRACTION (SVE)	PVC. SCH. 40	2"/4"	87	80-85/55-65	.02
AW-20	NESTED AIR SPARGE (AS)/SOIL VAPOR EXTRACTION (SVE)	PVC. SCH. 40	2"/4"	87	80-85/55-65	.02

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PROCESS & INSTRUMENTATION DIAGRAM
AS/SVE SYSTEM
ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

DRAWING #: P-1
DATE: 02/11/00
PROJECT NO: M0600-044-02

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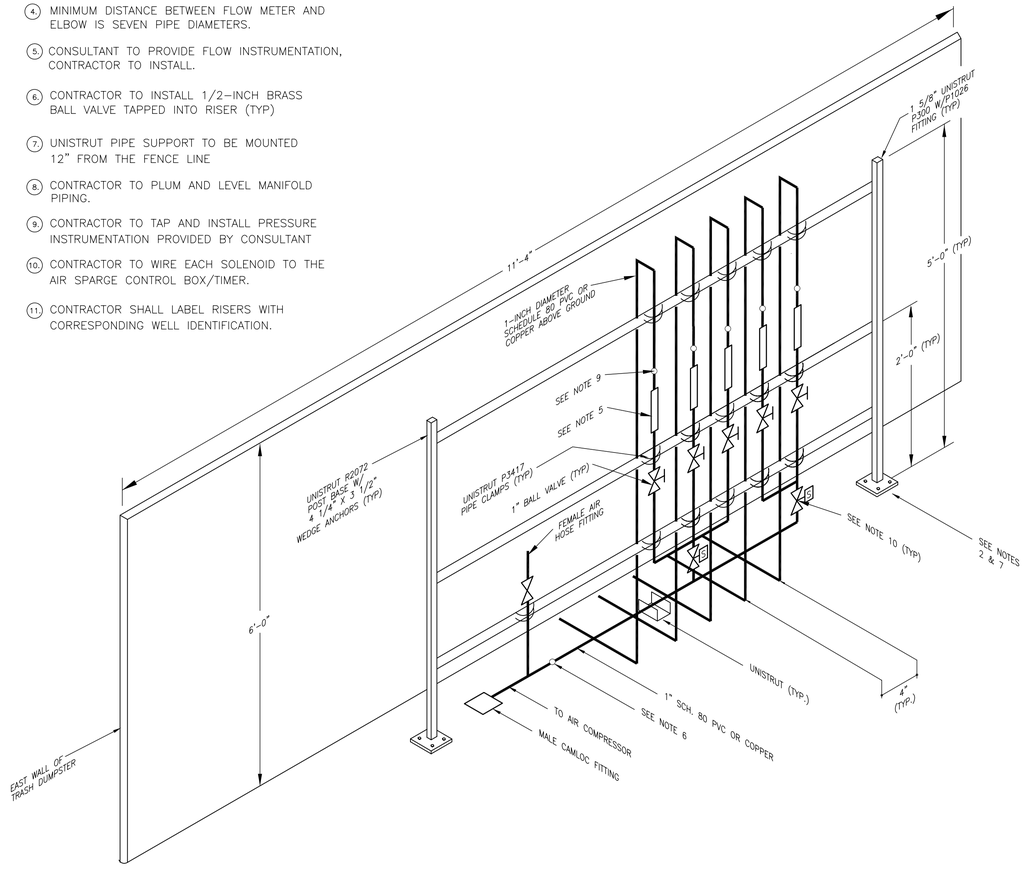
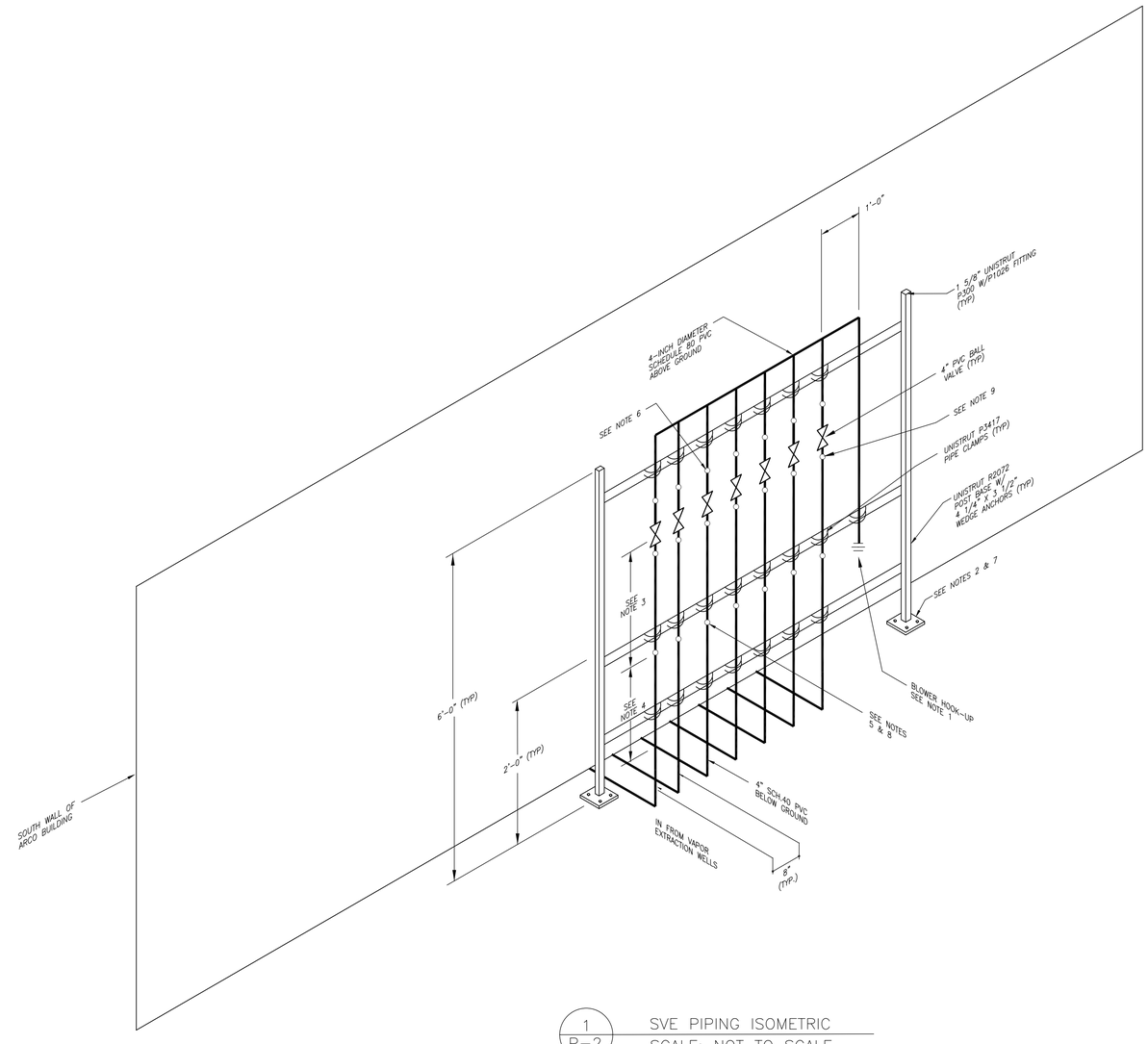
NOTES:

1. CONTRACTOR TO ROUTE 4–INCH DIAMETER FLEX HOSE AS SPECIFIED FROM UNION TO CONNECTION AT C–1
2. UNISTRUT PIPE SUPPORT WITH BASE. ANCHOR BASE TO GROUND SURFACE WITH A MINIMUM OF 3 – 4 1/2" X 1/2" ANCHOR BOLTS. IF EQUIPMENT ENCLOSURE IS LOCATED ON DIRT OR ASPHALT, THE UNISTURUT MAY BE DRIVEN INTO THE GROUND.
3. MINIMUM DISTANCE BETWEEN VALVE AND FLOW METER IS FIVE PIPE DIAMETERS.
4. MINIMUM DISTANCE BETWEEN FLOW METER AND ELBOW IS SEVEN PIPE DIAMETERS.
5. CONSULTANT TO PROVIDE FLOW INSTRUMENTATION, CONTRACTOR TO INSTALL.
6. CONTRACTOR TO INSTALL 1/2–INCH BRASS BALL VALVE TAPPED INTO RISER (TYP)
7. UNISTRUT PIPE SUPPORT TO BE MOUNTED 12" FROM THE FENCE LINE
8. CONTRACTOR TO PLUM AND LEVEL MANIFOLD PIPING.
9. CONTRACTOR TO TAP AND INSTALL PRESSURE INSTRUMENTATION PROVIDED BY CONSULTANT
10. CONTRACTOR TO WIRE EACH SOLENOID TO THE AIR SPARGE CONTROL BOX/TIMER.
11. CONTRACTOR SHALL LABEL RISERS WITH CORRESPONDING WELL IDENTIFICATION.



1 / P–3 AS PIPING ISOMETRIC
SCALE: NOT TO SCALE



1 / P–2 SVE PIPING ISOMETRIC
SCALE: NOT TO SCALE

NOTE:
A CONSULTANT REPRESENTATIVE MUST BE PRESENT DURING THE INSTALLATION OF NOTES 5, 6, AND 9.

REVISION	DATE	REASON

SECOR INTERNATIONAL INCORPORATED
1830 WEST UNIVERSITY, SUITE 106
TEMPE, ARIZONA 85281

PIPING ISOMETRIC
AS/SVE SYSTEM
ARCO FACILITY NO. 1523
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PHOENIX, ARIZONA 85016

DRAWING #: P–2
DATE: 02/11/00
PROJECT NO: M0600–044–02

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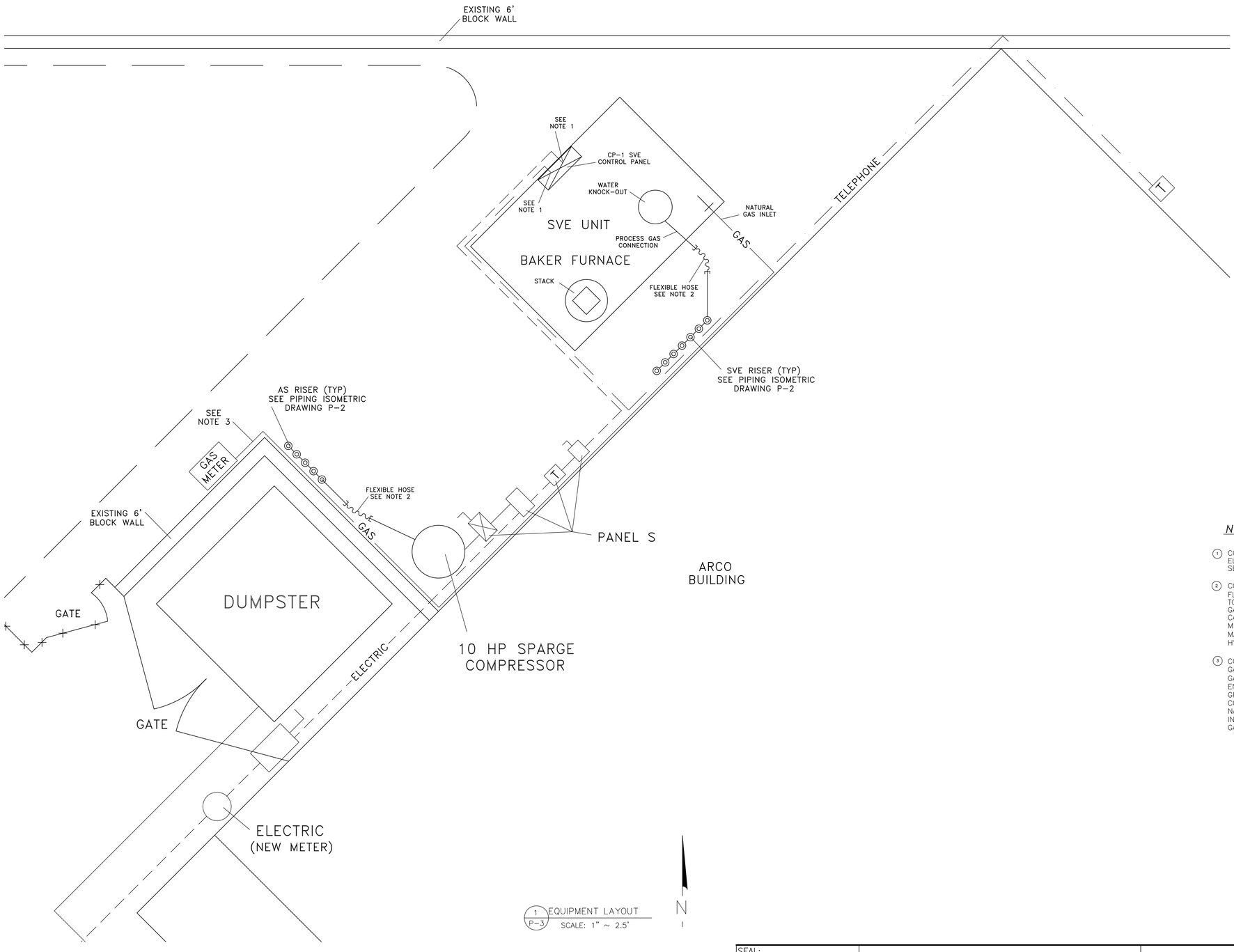

1 P-3 EQUIPMENT LAYOUT
SCALE: 1" ~ 2.5'

NOTES

1. CONTRACTOR TO PROVIDE APPROPRIATE ELECTRICAL SERVICE TO THE CP-1. SEE DRAWING E-1.
2. CONTRACTOR TO INSTALL 4-INCH DIAMETER FLEX HOSE FROM PROCESS GAS CONNECTION TO PIPING MANIFOLD. HOSE FROM PROCESS GAS CONNECTION TO MANIFOLD TO BE CAPABLE OF OPERATING AT 8-INCHES OF MERCURY VACUUM AND BE COMPOSED OF MATERIAL WHICH IS COMPATIBLE WITH HYDROCARBONS.
3. CONTRACTOR TO INSTALL 1.5-INCH DIA. STEEL GAS LINE ABOVE GROUND FROM SOUTHWEST GAS CORPORATION METER TO INSIDE EQUIPMENT ENCLOSURE. GAS LINE TO BE ROUTED ABOVE GROUND FROM STUB-UP TO NATURAL GAS CONNECTION APPROXIMATELY 20 FEET. 5 PSI NATURAL GAS SUPPLIED FROM SOUTHWEST GAS. INSTALL GAS SHUT-OFF VALVE AT INLET TO NATURAL GAS CONNECTION.

SEAL:

SECOR INTERNATIONAL INCORPORATED
1830 WEST UNIVERSITY, SUITE 106
TEMPE, ARIZONA 85281

EQUIPMENT LAYOUT
AS/SVE SYSTEM
ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

DRAWING #: P-3
DATE: 02/11/00
PROJECT NO: M0600-044-02

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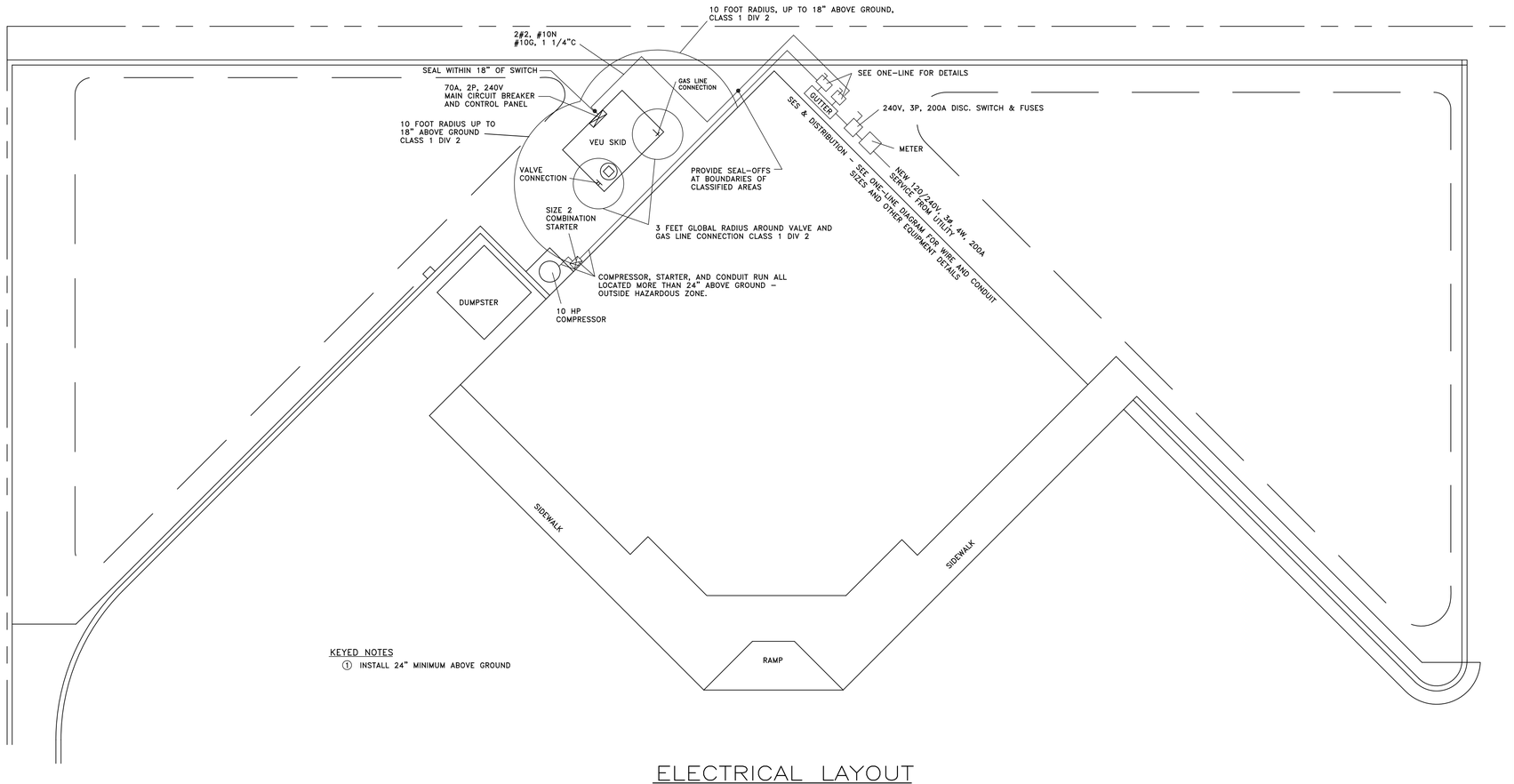
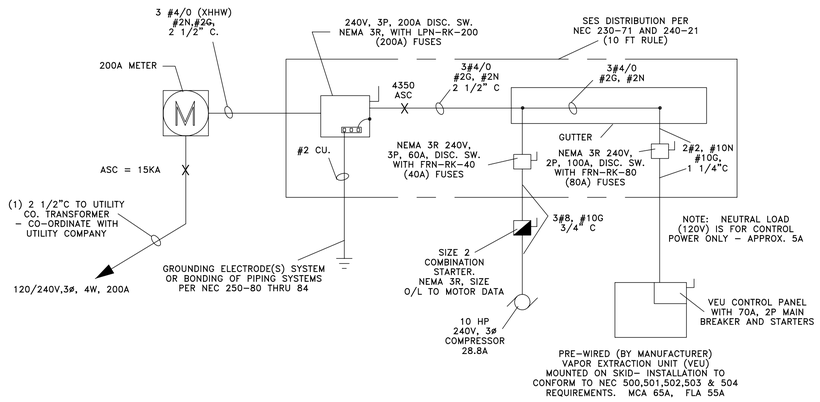


ELECTRICAL LAYOUT

SCALE: 1" = 8'-0"



ONE LINE DIAGRAM

N.T.S.

LOAD CALCULATIONS

10 HP MOTOR, 240V, 3ø = 28.8A x 1.25	=	36A
VEU (VAPOR EXTRACTION UNIT), 240V, 1ø	=	65A
		101A

SERVICE IS 200A - OK.

(120V LOAD IS ONLY APPROX. 5A. #10 NEUTRAL FOR VEU IS MORE THAN SUFFICIENT. HALF SIZE SERVICE NEUTRAL IS TO ACCOMODATE ANY FUTURE 120V LOAD CHANGES - IF ANY)

ELECTRICAL SPECIFICATION

1. All materials, equipment and installation must comply with all applicable laws, codes, rules and regulations required by City, County and State as well as Federal requirements.
2. Contractor to visit site prior to submitting bid and shall include in his bid all materials and installation of miscellaneous items required for the operation of the system whether specifically called for or not. The drawings are intended to convey scope of work and does not specify all incedentals necessary.
3. Unless specifically called out otherwise all materials shall be new, UL listed and free from defects. All material shall be adequately protected by the contractor untill installation is complete.
4. Contractor to install all raceways per code. All hardware to be approved for use as installed. All EMT conduit shall have compression fittings. All conduits to include a code sized bonding wire.
5. PVC coated steel flexible (Seal-Tite) conduit may be used for connections to equipment subject to vibration (motors, transformers, etc).
6. All electrical conductors to be copper. Minimum size is No. 12 AWG. Insulation to be THHN for dry locations and XHHW for damp locations.
7. Conductor sizes and types to conform to NEC Article 310 as amended by the local authorities having jurisdiction except that minimum size of power wiring shall be #12.
8. Control wiring to be #14 unless otherwise specified.
9. The grounding system shall be installed per NEC Article 250 as amended by the local authorities having jurisdiction.
10. Circuit breakers shall be switch rated, ambient compensated and match or exceed the AIC rating of the panel to which they are added.
11. All panel boards shall have directory cards identifying all circuits and spaces brought up to date to include all circuits added by the project.
12. All circuits on MCCs and DBs shall be properly labeled accordingly. J-boxes, disconnect switches, starters, etc. shall be tagged with circuit sources. Conductors shall be marked at all termination and junction points with labels identifying circuit sources.
13. Provide switched neutrals on all circuit breakers feeding Class 1 and Class 2 areas with neutrals.
14. Provide GFCI on circuits with neutrals to devices above classified areas.
15. Disconnect switches shall be heavy duty, quick make, quick break, horsepower rated.
16. All hazardous location wiring as defined by NEC Article500 shall be installed per Articles 501, 502, 503, and 504 as amended by the local authority having jurisdiction.
17. Underground conduit to be buried a minimum of 24". Underground metal conduit shall be wrapped with polyethylene tape, Scotch #50 or equal, spiral wrapped 1/2 lapped to an overall thickness of not less than 20 mils. PVC schedule 80 may be used underground where specifically called out and shall be in accordance with NEC Article 347. Rigid non-metallic conduit (including PVC) shall not be used in hazardous classified locations.
18. Transient Voltage Surge Suppressers (TVSS) shall be rated for voltage and ampacity indicated on plans. TVSS device must meet or exceed U.L. 1449, Class C, 200,000 amps per phase. Modes of protection: phase to phase, phase to ground, Neutral to ground.
19. Contractor shall provide as-built drawings which identify all deviations from the contract drawings. As-built drawings shall be submitted prior to acceptance by the owner.
20. Contractor to coordinate work with the utility company to meet their requirements.
21. Contractor to coordinate work with other trades to avoid conflict of space, scheduling or other requirements.
22. Contractor to guarantee electrical installation and workmanship for a period of one year following date of final acceptance by the owner. Defective work or hardware identified within the one year guarantee period is to be replaced and installed promptly by the contractor at no expense to the owner.

NOTES:
1. ALL EQUIPMENT, INSTRUMENTATION, CONDUIT AND WIRING WITHIN THE HAZARDOUS CLASSIFIED AREA BE RATED FOR THE LOCATION.
2. PROVIDE CONDUIT SEALS WITHIN 18" OF SPARK PRODUCING EQUIPMENT ENCLOSURES (SWITCHES, MOTORS, SOLENOIDS, RELAYS, INSTRUMENTS, ETC) WITHIN THE CLASSIFIED AREAS PER NEC 501-5.
3. PROVIDE CONDUIT SEAL AT BOUNDARY OF THE CLASSIFIED AREAS PER NEC 501-5.
4. CONDUIT AND WIREWAYS WITHIN THE CLASSIFIED AREAS SHALL COMPLY W/ NEC 501-4.
5. REMEDIATION EQUIPMENT IS PRE-ASSEMBLED BY MANUFACTURER AND IS ASSUMED TO BE RATED FOR THE HAZARDOUS LOCATIONS AS SHOWN.
6. INSTALL AND CONNECT THE EQUIPMENT PER MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

SEAL:

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1830 WEST UNIVERSITY, SUITE 106
TEMPE, ARIZONA 85281

ELECTRICAL PLAN

ARCO FACILITY NO. 1523
2322 E THOMAS ROAD
PHOENIX, ARIZONA 85016

DRAWING #: E-1
DATE: 08/25/00
PROJECT NO: M0600-044-02

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